



Department
of Health

Research and development work relating to assistive technology

2014-15

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Department of Health

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2014-15

Presented to Parliament pursuant to Section 22 of
the Chronically Sick and Disabled Persons Act 1970

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Introduction

About this report

Section 22 of the Chronically Sick and Disabled Persons Act 1970 requires a report to be laid before Parliament each year on progress made in Government-funded research relating to equipment that might increase the range of activities and independence or well-being of disabled people, known as assistive technology.

Working with stakeholders, in 2001 the Foundation for Assistive Technology developed the following definition for assistive technology:

Assistive technology is any product or service designed to enable independence for disabled and older people.

This broad definition means that a wide range of products and services are eligible for inclusion in the report. As technology advances, the breadth of work covered is constantly expanding. The research covers not only specific products, but also systems, combinations of technologies, and interfaces to mainstream technology such as the internet.

For the purpose of this report, products and systems are further classified as assistive technology if their adoption and use is under some measure of control by the disabled and older end user and there is a level of meaningful interaction by the end user with the product or system. This therefore excludes telemedicine services such as videoconferencing between a general practitioner and a hospital consultant, using equipment in the hospital and GP surgery, as these technologies are primarily used by, and operated under the control of, the healthcare professionals. Neither does the report feature research on implanted technologies over which the user has no control or interaction, such as hip replacements. The report aims to reflect research relating to a wide range of impairments and conditions, and to cover research on service provision and patterns of use as well as development and evaluation of technologies.

The 2014/15 report highlights developments in funding for assistive technology research and innovation, some particular areas of research activity, and the role of Academic Health Science Networks in supporting uptake and spread of assistive technology. The Annex provides a listing of Government-funded assistive technology research and development projects current in 2014/15.

Developments in funding

Assistive technology, rehabilitation and musculoskeletal biomechanics – action plan

The Engineering and Physical Sciences Research Council (EPSRC) has made good progress in achieving the aims of its Assistive technology, rehabilitation and musculoskeletal biomechanics action plan^a.

An Assistive, Adaptive and Rehabilitative Technologies Sandpit took place 1st - 5th September 2014. This aimed to engender a radical change in the research undertaken in this field in the UK, by bringing new researchers into the field and by encouraging novel and transformational approaches. There were 27 participants from a range of science, engineering and clinical backgrounds. Four research projects were pitched on the final day of the sandpit and after peer review three were funded. All three projects are comprised of multi-centre, multidisciplinary teams and represent a total investment of £5.3 million.

In addition, the EPSRC announced the availability of up to £5 million to encourage the development of disruptive technologies for use in hearing aid devices. This intervention was designed to encourage multidisciplinary research collaborations focussed primarily on the following research challenges:

- Optimising hearing aid devices for individuals.
- Speech-in-noise performance in hearing aid devices.
- New methods of signal transduction.

Additional considerations included increasing battery life, design and manufacturing research challenges. The EPSRC received 19 proposals and after peer review eight were successful in securing funding, resulting in a total investment of £5.3 million.

Details of the new projects will be included in the 2015/16 report on Research and development work relating to assistive technology. The quality of applications submitted through both activities was high and the EPSRC hopes these will stimulate further applications in assistive technologies through its standard grants funding route.

The EPSRC has been working to promote Assistive technology, rehabilitation and musculoskeletal biomechanics as a priority area for fellowships at a series of Early Career Roadshows at 12 universities across the country as well as on other visits. The EPSRC is now reviewing applications received to see if the desired increase in the quality and number of applications is being achieved.

SBRI Healthcare

A new Small Business Research Initiative (SBRI) Healthcare competition has been launched by NHS England to find innovative products and services with potential to improve outcomes for

^a www.epsrc.ac.uk/research/ourportfolio/researchareas/assistivetech/assistivetechactionplan/

older people with multi-morbidities^b. Defined as suffering two or more chronic conditions, multi-morbidity affects patients of all ages with prevalence increasing markedly with age. The competition closes on 11th August 2015 with winners announced in December. SBRI Healthcare is looking to award a total of £1 million for ideas from companies focussed on challenges in the following areas:

- Addressing functional needs in the elderly.
- Faecal and urinary incontinence in frail elderly people.
- Minimising the impact of falling.

Inclusive Technology Prize

Run by Nesta, with support from the Office for Disability Issues, Innovate UK, The Department for Business Innovation and Skills and Irwin Mitchell, and in partnership with Leonard Cheshire Disability, the Inclusive Technology Prize is designed to inspire technological innovations in assistive products, systems and aids and encourage co-creation with disabled people. Ten finalists were announced on 30th June 2015^c and each will receive £10,000. A winner will be selected in March 2016.

^b www.sbrihealthcare.co.uk/news/100000-funding-awards-on-offer-to-small-businesses-in-latest-sbri-healthcare-competition/

^c www.inclusivetechprize.org/news-blogs/congratulations-10-finalists

Research current in 2014/15

Some particular areas of research activity are highlighted below. Reference numbers refer to projects listed in the Annex.

Mobility

Section 22 of the Act makes specific reference to the need for research relating to technologies assisting the indoor and outdoor mobility of disabled people. This continues to be a wide-ranging field of Government-funded research.

Researchers at University College London are seeking to develop an exoskeleton that can be worn and also act as a muscle so that it can support the whole walking cycle⁷⁹. The aim is to provide support and control to a user, for example a patient with a spinal cord injury, enabling the individual to walk otherwise unaided. The team has made a video about their research available on YouTube^d.

Innovate UK has made an award to the company Flat Free Tyres for development of puncture-proof tyres for wheelchair and other markets⁶⁷. Other projects addressing the needs of wheelchair users include development of an advanced pressure relief cushion⁵ and creation of custom moulded seats⁴¹. Motivation, which supports people with mobility disabilities around the world, received funding to design a range of wheelchairs that can be assembled from one set of components³⁰.

Assistive technologies can also address needs for navigation support. One project is using a crowdsourced approach to design an intelligent route planning system for wheelchair users in an urban environment², and researchers have created a smart phone app to allow visually impaired people to navigate the 'last ten yards' to their destination⁵¹.

Innovation in prosthetics

In partnership with the company Blatchford, a team at Loughborough University is carrying out research to enable the development of a prosthesis that will respond to biological feedback via a conduit between the artificial prosthetic and remaining biological muscle and nerves⁷².

Researchers at other universities are aiming to develop an intelligent prosthetic liner that will allow clinicians to quickly and accurately assess and optimise socket fit⁴⁹, and to study the potential for lower limb prostheses with greater energy efficiency^{13, 28}.

Innovate UK has funded work by the company Touch Bionics on advanced pattern recognition technology for a multi-articulating prosthesis⁶.

Vision, hearing and speech

Current projects in sensory impairment include development of a device for the provision of accessibility software addressing the needs of people with visual impairment¹, a system for treatment of amblyopia using interactive computer games⁸, and a comparison of the effectiveness of electronic and optical magnifiers⁵⁷.

^d <http://www.youtube.com/watch?v=Ew6Y0cDpdek>

Researchers at the University of Southampton are seeking engineering solutions to the problem that conventional hearing aids amplify both speech and background noise indiscriminately¹⁹.

Researchers at the University of Hull have studied implants and sensors to detect mouth and tongue movement, and use of this data to synthesise speech for a person whose voice box has been removed²². Research on speech synthesis at the University of Edinburgh has included construction of personalised communication apps for people with motor neurone disease¹⁸.

Rehabilitation following stroke

Many people who have a stroke need long-term support to help them manage any difficulties they have and regain as much independence as possible.

Projects are looking at a range of technologies and approaches with potential to improve hand and arm function after stroke^{35, 54, 60, 76}.

Other projects are studying technologies to improve walking^{4, 21}, to aid rehabilitation of patients with facial paralysis⁷⁷, and for use in therapy for aphasia¹².

Self-care

A range of projects are focusing on technologies supporting self-care and self-management.

The National Institute for Health Research is funding a £2 million programme of research on development, evaluation and implementation of a computer-based self-management programme for people with type 2 diabetes²⁰.

Researchers at the University of Manchester are studying personalised monitoring and enhanced self-management in mental health⁵⁵, and researchers at the University of Oxford have conducted research on a telehealth based application enabling people with chronic obstructive pulmonary disease to report daily symptoms and medicine use⁷¹.

Furniture and home appliances

Furniture and home appliances can be designed and developed to be of particular use to people with limited mobility.

Innovate UK has funded a project to develop a lightweight semi-autonomous cantilever table capable of moving under its own power and adjusting the height and altitude of its table surface³⁹.

Another project aims to develop a low energy washing machine that will enable clothes to be washed and dried on hangers in the washing machine cabinet⁴⁶.

Assistive technologies in education

Jisc, which receives core funding from UK higher education and further education funding bodies, is carrying out several projects on assistive technologies for Further Education and skills⁹.

Other research is developing a tool to assist with reading aloud and comprehending mathematical symbols⁶⁹, a tool to support learners with dyslexia⁶², and technology to enable access to computers for users with special educational needs⁴⁵.

Supporting uptake and spread of assistive technology

Academic Health Science Networks

Academic Health Science Networks (AHSNs) have been set up to support local health economies to improve health outcomes of their communities. AHSNs also maximise the contribution of the NHS to economic growth by enabling and catalysing change through collaboration, and the spread of innovation and best practice. To do this they work with local NHS partners, academia and industry.

AHSNs are supporting the uptake and spread of assistive technology through a range of projects in related fields, such as supporting telehealth/care pilots, supporting the development and adoption of innovative apps and devices, and helping develop the digital and informatics infrastructure. In addition, AHSNs have programmes of work targeted at specific patient groups such as older populations or those managing long term conditions.

Some examples of recent work by AHSNs in supporting the spread of innovation in assistive technology are described below.

Technology enabled care services

Telehealth and telecare offer opportunities to transform the way people are able to manage their own health and communicate with clinical professionals. Three AHSNs – West Midlands, North East and North Cumbria and East Midlands - are collaborating to support the development and widespread adoption of one service called Simple Health/Flo.

The system uses SMS technology and is owned by the NHS having been developed by Stoke-on-Trent Clinical Commissioning Group. Flo offers a simple and responsive communication process – empowering patients and allowing remote monitoring by clinicians. At around 8p a text it is cost effective to administer and free for patients; the total cost of Flo per patient per year typically ranges from £30 – £80 for common long term conditions compared, for example, to the £67 cost of a single home visit by a nurse.

The AHSNs' focus has been on supporting and accelerating widespread adoption and diffusion of Flo. They have supported a variety of pragmatic interventions: project managers and clinical champions; licences for organisations joining the programme; equipment such as blood pressure monitors; training; and independent evaluations. They have also helped develop business cases to secure further funding and showcase telehealth best practice at events. With this support, an area of huge but unrealised potential is now flourishing with telehealth approaches being pulled into practice at scale due to support from the AHSNs. Flo is now in use at over 70 health and social care organisations.

Overcoming barriers to adoption of innovation

Investment by the West Midlands AHSN supported the development of everyday-life^e. This resource supports the NHS England technology enabled care aims by providing a listing of currently available technology within the UK that is designed to assist people with specific long-term conditions or ailments. It helps them support, manage or control their health condition and to continue to live independently at home for longer.

everyday-life has been designed and created to help patients, carers, clinicians and commissioners of services find products for health and wellbeing either in their own homes or in a care/clinical setting. Results are displayed in a report that gives people the opportunity to find out more information on the suggested products, as well as allowing them to buy their chosen products if they want to. For those who already have a good idea what they want, or as an aid to healthcare professional research and service commissioning, everyday-life also offers a searchable database detailing the wide range of current technologies available.

On behalf of industry, everyday-life provides impartial information on products and services available within the UK. Suppliers are encouraged to provide information for inclusion on the website, stimulating uptake of technology and providing wealth creation within the supplier industries.

Assistive technologies supporting people with diabetes

Type1 Kidz (T1KZ) is a peer support group for children and young people with Type 1 diabetes. Funding from the North East and North Cumbria AHSN aimed to: expand the peer support group across the region; implement a simple text messaging service designed by CYP to help other children and young people manage their condition; expand the peer support group and telehealth pathways to older youths and students; and reduce the overall cost of diabetes to the NHS. The telehealth pilot study showed that the system needed to be more interactive and have better wording to be applicable to young people. The improved telehealth model is now being rolled out.

The Oxford AHSN has supported the use of a remote monitoring system for women with gestational diabetes, working with the University of Oxford's Institute of Biomedical Engineering. This is enabling women to input their blood sugar levels using a Bluetooth-enabled meter and smartphone, rather than attending fortnightly check-ups in hospital. Diabetes specialists can instantly review these readings and identify and respond to any abnormalities much more quickly. The ambition is to have this approach adopted by all acute trusts in the Oxford AHSN region resulting in 32,000 fewer hospital visits by pregnant women with savings estimated at £700,000. The project won the Best Digital Initiative in the Quality in Care Diabetes Awards 2014.

PolyPhotonix were new to working with the NHS. The company had developed a light therapy mask for the prevention and treatment of diabetic retinopathy; a condition which costs the NHS over £1 billion a year. Current treatment costs as much as £10,000 per patient for each eye; the PolyPhotonix sleep mask costs £250 for 12 weeks' treatment. Support from the AHSNs in Kent, Surrey and Sussex, North East and North Cumbria and the South West has helped speed up the mask's route to market by engaging clinicians, validating the market and supporting the faster completion of multicentre trials.

^e <http://everyday-life.co.uk>

Annex: Listing of assistive technology research and development projects 2014-15

Glossary of acronyms for funders:

AHRC	Arts and Humanities Research Council
BIS	Department for Business, Innovation and Skills
DH	Department of Health
EPSRC	Engineering and Physical Sciences Research Council
ESRC	Economic and Social Research Council
HEE	Health Education England
MRC	Medical Research Council
NIHR	National Institute for Health Research
NISCHR	National Institute for Social Care and Health Research

Research and development work relating to assistive technology

Ref	Project title, organisation, contact	Summary	Funding
1	Accessibility Pad (aPad) Dolphin Computer Access http://www.yourdolphin.com/address_details.asp	The project aims to develop a prototype device for the provision of accessibility software addressing the needs of people with visual impairment.	Innovate UK Apr 14 – Mar 16 £235,772
2	Accessible routes from crowdsourced cloud services University College London www.arccs.org/#!contact/c24vq	The project is using a crowdsourced approach to design an intelligent route planning system for wheelchair users in an urban environment.	EPSRC Oct 14 – Apr 16 £344,853
3	AAL-WELL: ambient assistive living technologies for wellness, engagement, and long life University of Sheffield www.catch.org.uk/contact-us	The project is harnessing the potential of ambient assistive technology to promote active and healthy aging for older people with mild cognitive impairment.	ESRC Apr 13 – Apr 16 £144,592
4	AFOOT: ankle foot orthoses for people with stroke Salford Royal NHS Foundation Trust sarah.tyson@manchester.ac.uk	The study is comparing two commonly used types of ankle foot orthosis: a bespoke and an off-the-shelf. Recruitment closed in September 2014 and outputs are planned.	NIHR Jan 12 – Jun 15 £249,313
5	Airospring AS300 Baltex www.baltex.co.uk/contact	The company has developed a material with potential as a cushion material that uniformly distributes pressure and offers advantages for the relief of pressure ulcers particularly for wheelchair users and those who remain seated for long periods of time. The project is developing prototype products for evaluation and testing.	Innovate UK Sep 13 – Aug 15 £229,961
6	APTMAP: advanced pattern recognition technology for multi articulating prosthesis Touch Bionics www.touchbionics.com/contact/international	The research aimed to produce a brain-machine interface software and hardware solution providing upper limb amputees with a fully independent multi-articulating five digit prosthesis with advanced muscle signals to provide intuitive control.	Innovate UK Jan 13 – Jun 15 £386,003

Annex: Listing of assistive technology research and development projects 2014-15

Ref	Project title, organisation, contact	Summary	Funding
7	Assessing and suppressing upper limb tremor to enable independence University of Bristol simon.neild@bristol.ac.uk	A prototype orthosis incorporating an adjustable tremor suppression device has been developed and tested with people with Parkinson's disease.	NIHR Aug 11 – Jul 14 £426,238
8	Assessment and treatment of patients with amblyopia using interactive binocular computer games Nottingham University Hospitals NHS Trust http://www.lazy-i-bit.com/	The researchers have previously developed a treatment for amblyopia which has shown improvements in vision with only three hours of treatment and which is fun to undertake (the I-BiT™ system). The current system is hospital based and the researchers aim to modify it for home use while including further improvements.	NIHR Sep 14 – Aug 17 £902,919
9	Assistive technologies for Further Education and skills Jisc www.jisc.ac.uk/rd/projects/assistive-technologies-for-fe-and-skills	Projects funded in the area of assistive technologies are: Planning tool for autistic learners; User testing to support disabled learners; Raising mental health awareness through augmented reality; Kinetic applications.	Jisc (Jisc receives core funding from UK higher education and further education funding bodies) Apr 14 – Jul 15
10	Assistive technology for children and young people with low vision Cochrane Eyes and Vision Group http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD011350.pub2/abstract	This Cochrane review aimed to assess the effect of electronic assistive technologies on reading, educational outcomes and quality of life in children and young people with low vision, but did not identify any randomised controlled trials in this subject area.	NIHR Review published Jun 15

Ref	Project title, organisation, contact	Summary	Funding
11	<p>ATTILA trial: assistive technology and telecare to maintain independent living at home for people with dementia</p> <p>South London & Maudsley NHS Foundation Trust</p> <p>robert.j.howard@kcl.ac.uk</p>	<p>The study aims to find out if telecare can safely extend the time people with dementia can continue to live independently in their own homes, and whether this is cost effective. It also aims to find out if it can reduce the volume of acute, unplanned admissions to hospital, if it reduces stress in families and unpaid care-givers, and whether it can increase the quality of life of people living with dementia. Recruitment is expected to complete in August 2016.</p>	<p>NIHR</p> <p>Jan 13 – Oct 17</p> <p>£1,801,834</p>
12	<p>Big CACTUS: clinical and cost effectiveness of aphasia computer therapy compared with usual stimulation or attention control long term post stroke</p> <p>University of Sheffield</p> <p>www.sheffield.ac.uk/scharr/sections/dts/ctru/bigcactus</p>	<p>The study aims to compare outcomes for people with persistent aphasia using computerised speech and language therapy at home with those having usual care (standard speech and language therapy provision or general daily communication activity), or attention control (daily completion of puzzle book activities). Recruitment began in October 2014.</p>	<p>NIHR</p> <p>Jan 14 – Jan 19</p> <p>£1,480,713</p>
13	<p>Biomimetic, self tuning, fully adaptable smart lower limb prosthetics with energy recovery</p> <p>University of Leeds</p> <p>a.a.dehghani-sanij@leeds.ac.uk</p>	<p>Virtual prototyping of a semi-active lower limb prosthesis has been carried out and findings published:</p> <p>http://pih.sagepub.com/content/229/5/350</p>	<p>EPSRC</p> <p>Apr 13 – Mar 16</p> <p>£618,676</p>
14	<p>Brain-computer interface for monitoring and inducing affective states</p> <p>University of Reading; Plymouth University</p> <p>s.j.nasuto@reading.ac.uk; eduardo.miranda@plymouth.ac.uk</p>	<p>The researchers are studying a brain-computer interface system that can monitor emotional states and, in combination with a database of music, generate sounds that can alter emotions. Such a system could be used potentially in treating mood disorders such as depression. Initial findings have been published, and the research was featured in March 2015 on Channel 5's The Gadget Show.</p>	<p>EPSRC</p> <p>Aug 12 – Mar 17</p> <p>£876,103</p>

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Ref	Project title, organisation, contact	Summary	Funding
15	CASA: Connecting Assistive Solutions to Aspirations Leone Services alexandra.eavis@thisiscasa.com	The project aimed to understand how to transform the assistive technology market by integrating new and existing technologies in ways that create a better fit with an individual's environment, social networks and lifestyle aspirations.	Innovate UK Jan 14 – Sep 14 £372,342
16	Clasp: Digital Tactile Anxiety Management for the Health Internet of Things Lancaster University http://myclasp.org/about-clasp/contact-us/	The aim of this project is to co-design and co-produce, with a cohort of autism sufferers, their friends and family, a tactile digital anxiety management and peer-support tool to assist people with autism in understanding and managing their anxiety in social engagement.	EPSRC Jan 15 – Jul 16 £293,031
17	COMODAL: computer models for assisted living Coventry University www.comodal.co.uk/#contact	The project has produced evidence to support the development of a consumer market for electronic assisted living technologies, with a focus on people aged 50-70: www.comodal.co.uk/#documents	Innovate UK Apr 11 – May 14 £753,991
18	Deep architectures for statistical speech synthesis University of Edinburgh www.research.ed.ac.uk/portal/en/persons/junichi-yamagishi	The project is creating technology to allow people to communicate in their own voice when their natural speech has become hard to understand or when they can no longer speak. The team has constructed personalised communication apps for ten people with motor neurone disease, with positive feedback.	EPSRC Nov 11 – Oct 16 £741,163
19	Designing better hearing aids using physiologically inspired speech enhancement University of Southampton www.southampton.ac.uk/engineering/about/staff/bleeck.page#background	A conventional hearing aid amplifies both speech and background noise indiscriminately, so even though the neural pathways of the brain may be unimpaired, the task of distinguishing speech from noise becomes much harder. The project is developing engineering solutions to this speech-in-noise problem.	EPSRC Feb 13 – Feb 16 £613,105

Research and development work relating to assistive technology

Ref	Project title, organisation, contact	Summary	Funding
20	<p>Development, evaluation and implementation of a computer-based self-management programme for people with type 2 diabetes</p> <p>The Whittington Hospital NHS Trust</p> <p>www.ucl.ac.uk/pcph/research-groups-themes/e-health/projects/projects/dmsmp</p>	<p>The effectiveness and cost-effectiveness of a computer-based self-management programme (HeLP-Diabetes) is being evaluated as part of a trial. An implementation study is determining the impact it has on health and health outcomes in routine practice, and the resources needed for successful implementation.</p>	<p>NIHR</p> <p>Mar 11 – Feb 16</p> <p>£2,015,521</p>
21	<p>Development of a device for the motorised rehabilitation of walking</p> <p>University of Manchester</p> <p>www.manchester.ac.uk/research/Sarah.tyson/personaldetails</p>	<p>The project aims to develop a robot to retrain sit-to-stand and walking for people with severe disabilities.</p>	<p>NIHR</p> <p>Aug 14 – Oct 16</p> <p>£895,215</p>
22	<p>DiSArM: digital speech recovery from articulator movement</p> <p>University of Hull</p> <p>J.M.Gilbert@hull.ac.uk</p>	<p>The research studied implants and sensors to detect mouth and tongue movement, and use of this data to synthesise speech for a person whose voice box has been removed following injury or illness.</p>	<p>NIHR</p> <p>Oct 11 – Sep 14</p> <p>£612,094</p>
23	<p>Does the use of home based restorative rehabilitation technology enhance the clinical effect of botulinum toxin treatment for children with cerebral palsy who have arm movement difficulties</p> <p>University of Leeds</p> <p>http://medhealth.leeds.ac.uk/profile/700/725/nick_preston/1</p>	<p>This research fellowship has focussed on evaluation of increased benefits to upper limb function of home based assistive rehabilitation technology designed for children with cerebral palsy.</p>	<p>HEE / NIHR</p> <p>Jan 10 – Dec 14</p> <p>£293,171</p>
24	<p>Economic evaluation of mobility technology for disabled children: methodological and service commissioning implications</p> <p>Bangor University</p> <p>http://cheme.bangor.ac.uk/NathanBrayBiography.php</p>	<p>This PhD Studentship has explored the application of health economics to assistive mobility technology for children living with disability.</p>	<p>NISCHR</p> <p>Apr 11 –</p> <p>£59,977</p>

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Ref	Project title, organisation, contact	Summary	Funding
25	EDLAH KG&S Ltd www.edlah.eu/partners.html	The EDLAH project aims to offer to older people a One Stop Shop of information and services on a tablet device, phone or web applications to support independent living.	Innovate UK May 13 – Apr 16 £229,651
26	Effects of night positioning on sleep, postural deformity and pain in children and young people with cerebral palsy Chailey Heritage Clinical Services www.sussexcommunity.nhs.uk/get-involved/research_chailey.htm	The project has investigated the impact of night positioning equipment on the quality of sleep, pain and postural deformity. Results are available on the Trust's website: www.sussexcommunity.nhs.uk/Downloads/chailey_research/being_written/sleep-study-writeup.pdf	NIHR Nov 11 – Oct 14 £246,031
27	Empirical investigation and user-centred development of touch-screen text entry methods for older adults University of Strathclyde https://personal.cis.strath.ac.uk/mark.dunlop/contact/	The project has included investigation of a new touch-screen keyboard design for older adults that combines the familiar QWERTY keyboard layout with physical gesture. User studies with older adults showed the keyboard reduced miss-taps but was slower to use.	EPSRC Sep 13 – Aug 15 £286,294
28	Energy efficient lower limb prostheses University of Salford http://energy-efficient-lower-limb-prostheses.org.uk/contact/	The team are studying the potential for hydraulic technology to enable the controlled storage of energy, transfer of energy between joints, and return of energy in prosthetic legs.	EPSRC Sep 13 – Dec 16 £671,817
29	Frame fit: randomised controlled trial to determine the acceptability, safety and efficacy of a falls prevention exercise programme for walking frame users King's College Hospital NHS Foundation Trust www.kch.nhs.uk/news/public/news/view/16541	This study aims to find out if an exercise programme specifically designed for walking frame users improves balance and reduces falls.	HEE / NIHR Apr 14 – Mar 18 £157,871

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Ref	Project title, organisation, contact	Summary	Funding
30	Freedom through design: innovative product and service delivery for global wheelchair services Motivation Direct http://www.motivation.org.uk/contact	The project aimed to design a range of six wheelchairs that can be assembled from one set of components.	Innovate UK Jun 13 – Nov 14 £100,003
31	Head Up: development of a novel cervical orthosis to support neck weakness due to neurological disease University of Sheffield http://sitran.dept.shef.ac.uk/clinical-studies/headup/	A new neck collar, the Sheffield Support Snood, has been developed and evaluated in a small-scale trial. Positive feedback was received from people with motor neurone disease who participated. The researchers are in discussion with companies about production and marketing of the collar.	NIHR Apr 12 – Jul 14 £405,052
32	The Heels Trial: evaluation of lightweight fibreglass heel casts in the management of ulcers of the heel in diabetes Nottingham University Hospitals NHS Trust www.heels-trial.co.uk	The project is studying the effectiveness of lightweight fibreglass heel casts, or 'heel cups', in improving the rate of healing of ulcers in diabetes. Recruitment to the trial ceased on 4 September 2014 by which time 509 participants had been randomised.	NIHR Feb 11 – Aug 16 £1,358,852
33	Helping older drivers continue driving safer for longer Newcastle University www.side.ac.uk/inclusive-transport	Research to develop assistive technologies that will help older drivers continue to be safe.	EPSRC Jun 13 – Mar 15 £10,081
34	Home Service University of Sheffield http://www.catch.org.uk/contact-us/	This is a longitudinal study of ten elderly and physically disabled people using voice enabled assistive technology around the home. A demonstrator system consisting of a microphone and software running on a tablet device has been deployed in these homes and links back to speech recognition systems running on central servers.	EPSRC Sep 11 – May 16 £600,000

Annex: Listing of assistive technology research and development projects 2014-15

Ref	Project title, organisation, contact	Summary	Funding
35	i2r Medical: hand rehabilitation device i2r Medical www.i2rmedical.com/contact-us.php	The project aimed to develop a hand rehabilitation device for use, for example, following trauma, surgery or stroke.	Innovate UK Dec 12 – Nov 14 £154,000
36	i-Focus Advanced Digital Institute www.adi-uk.com/adi-contact.html	i-focus has aimed to improve how assisted living technology is used and deployed at pace and scale across all <i>dallas</i> (<i>delivering assisted living lifestyles at scale</i>) communities. DHACA (Digital Health and Care Alliance) has been formed to continue the promotion of interoperability across the health and care sector.	Innovate UK Jun 12 – May 15 £2,008,520
37	'In the making': a co-constructed mapping and feasibility study of digital fabrication labs and their potential to catalyse cultural change University of Salford	There are already examples of disabled people using digital fabrication to design and produce objects, such as ramps, that make day-to-day life easier. The researchers are studying the potential for this technology to help to improve the lives of disabled people, their families and the communities in which they live.	AHRC Jan 15 – Jun 16 £81,002
38	An innovative stander for rehabilitation James Leckey Design http://www.leckey.com/about-us/contact-us/	Development of an interactive standing frame for physically disabled adults and children.	Innovate UK Dec 13 – Nov 14 £93,354
39	IntelliTable: inclusively-designed intelligent furniture with robotic capabilities Marker Block http://sebastianconran.com/contact	Led by Sebastian Conran Associates, this project has developed a lightweight semi-autonomous cantilever table capable of moving under its own power and adjusting the height and altitude of its table surface.	Innovate UK Sep 13 – Sep 14 £99,967

Research and development work relating to assistive technology

Ref	Project title, organisation, contact	Summary	Funding
40	<p>Interactive sensory objects developed for and by people with learning disabilities</p> <p>University of Reading</p> <p>www.reading.ac.uk/art/about/staff/k-allen.aspx</p>	<p>The project has developed innovative strategies to enable access to, and enhance the experience of, museum and heritage sites for people with learning disabilities. Disabled users have been included as co-researchers in on-site museum workshops, to produce interactive electronics that activate objects from the collections as an alternative to conventional interpretation for all visitors.</p>	<p>AHRC</p> <p>Apr 12 – Mar 15</p> <p>£465,673</p>
41	<p>Intelligent seating design: the creation of custom moulded seats to meet the needs of severely disabled patients</p> <p>University of South Wales</p> <p>http://staff.southwales.ac.uk/users/2078-ajpartlo</p>	<p>The project developed an expert system which integrates seating and wheelchair system design into a single modelling application.</p>	<p>EPSRC</p> <p>Sep 09 – Nov 14</p>
42	<p>Limb Glider intelligent rehabilitation device</p> <p>Vivo Smart Medical Devices</p> <p>www.vivosmartmedical.com/contact/contact-details</p>	<p>The project aims to develop an intelligent device for home rehabilitation for lower and upper limbs.</p>	<p>Innovate UK</p> <p>Jan 15 – Jun 16</p> <p>£239,709</p>
43	<p>Limbs Alive: use of computer games to provide motivating, child centred therapy to improve bimanual skills for children with hemiplegic cerebral palsy</p> <p>Newcastle upon Tyne Hospitals NHS Foundation Trust</p> <p>http://www.limbsalive.com/the-company</p>	<p>The research team had previously designed computer games requiring two-handed control that encourage the use of a weaker arm. The aim of this project was to find out if children with hemiplegic cerebral palsy will play these games regularly and to establish their impact.</p>	<p>NIHR</p> <p>Jan 11 – Dec 14</p> <p>£248,198</p>

Annex: Listing of assistive technology research and development projects 2014-15

Ref	Project title, organisation, contact	Summary	Funding
44	Living it up NHS 24 Scotland https://portal.livingitup.org.uk/page/contact-us	Living It Up is one of four communities funded to deliver assisted living services at scale. The Living it Up web portal has been created to allow people to obtain advice and form social contacts in their area or online.	Innovate UK Jun 12 – May 15
45	Low cost force feedback technology to enable access to computers for users with special educational needs Generic Robotics www.genericrobotics.com/contact.html	Design of a software application programming interface to enable testing of the feasibility of using a low cost haptic device to interface with a common desktop publishing package.	Innovate UK Aug 14 – Oct 14 £16,480
46	Low energy washing machine Brompton Washscape www.facebook.com/pages/Brompton-Washscape-Ltd/497991330291621	The project aims to develop a washing machine suitable for use by people who have limited mobility. The concept is that clothes are washed and dried on hangers in the washing machine cabinet.	Innovate UK Aug 14 – Jul 16 £112,500
47	MALT: overcoming barriers to mainstreaming assisted living technologies University of Sheffield http://malt.group.shef.ac.uk/	To help support the implementation and expansion of telehealth, the project produced a toolkit of resources relating to financial modelling, business modelling, staff adoption and implementation, and patient acceptance.	Innovate UK Jun 11 – Nov 14 £1,806,530
48	Manipulating the appearance of stairs to improve safety University of Bradford www.bradford.ac.uk/life-sciences/optometry-and-vision-science/our-staff/david-elliott.php	The study found that stairs with high-contrast edge highlighters positioned flush with the tread edge improve safety on stairs, particularly for those with age-related visual impairment.	NIHR May 12 – Apr 14 £191,480

Research and development work relating to assistive technology

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49	MICA: integrated interfacial sensors for assessments of lower limb prosthetics University of Southampton www.southampton.ac.uk/engineering/about/staff/ldjiang.page#contact	The researchers are aiming to develop a prototype intelligent prosthetic liner that will allow clinicians to quickly and accurately assess and optimise socket fit.	MRC Apr 14 – Apr 16 £428,803
50	Occupational therapy intervention for residents with stroke living in UK care homes University of East Anglia www.uea.ac.uk/health-sciences/people/profile/g-peryer	A targeted three month programme of occupational therapy that included environmental adaptations was evaluated. The trial provided no evidence of benefit for the provision of a routine occupational therapy service for care home residents living with stroke related disabilities.	NIHR Sep 09 – Aug 15 £1,930,486
51	Optical navigation system for visually impaired people Spiral Scratch www.spiral-scratch.com/contact-us.html	Spiral Scratch has worked with the University of York to create a smart phone app to allow visually impaired people to navigate the "last ten yards" to their destination: www.youtube.com/watch?v=3SJkon0xPPo	Innovate UK Jun 13 – Jun 14 £105,296
52	Oral mandibular advancement devices for obstructive sleep apnoea hypopnoea Papworth Hospital NHS Foundation Trust www.papworthhospital.nhs.uk/content.php?/about/our_staff/profiles/Dr_Timothy_G_Quinnell	The trial found that mandibular advancement devices (MAD) are clinically effective and cost-effective in mild to moderate obstructive sleep apnoea hypopnoea. A semi-bespoke MAD is the appropriate first choice in most patients in the short term.	NIHR Sep 10 – Nov 14 £598,865
53	Pain rehabilitation University College London http://www.ucl.ac.uk/ucllc/people/n-berthouze	Outputs from the research include a wearable smartphone-based device aiming to bring physical rehabilitation away from mere physical activity sessions toward daily life functioning by facilitating awareness and management of body physical and emotional resources.	EPSRC May 10 – Jan 15 £1,154,530

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54	<p>Performance-based selective training for robot-mediated upper limb motor learning and stroke rehabilitation</p> <p>University of Birmingham</p> <p>www.birmingham.ac.uk/staff/profiles/psychology/miall-chris.aspx</p>	<p>Over half of stroke survivors experience difficulty with reaching and grasping. Recent research suggests that therapy-assisted rehabilitation works because it is personalised to the individual and focuses on those areas which the individual finds most difficult. The project aims to replicate this approach for this robot-mediated rehabilitation programme, changing task difficulty across training sessions.</p>	<p>MRC</p> <p>Nov 12 – Oct 15</p> <p>£404,452</p>
55	<p>Personalised monitoring and enhanced self-management in mental health (CareLoop)</p> <p>University of Manchester</p> <p>www.population-health.manchester.ac.uk/healthinformatics/research/Careloop/</p>	<p>The project aims to build a system for long-term symptom monitoring in mental health that can be linked to hospital and community based IT and care management systems.</p>	<p>MRC</p> <p>Feb 13 – Oct 15</p> <p>£897,681</p>
56	<p>PIA: personal assistant for coping at home</p> <p>StickyWorld</p> <p>https://www.stickyworld.com/contact</p>	<p>Innovate UK co-funded this European project. The PIA system provides support to older people by offering video clips of tips on how to overcome challenges with daily living. The PIA app is available on GooglePlay.</p>	<p>Innovate UK</p> <p>Mar 13 – Feb 15</p> <p>£64,813</p>
57	<p>Portable electronic vision enhancement systems for near vision in visual impairment</p> <p>University of Manchester</p> <p>www.manchester.ac.uk/research/Chris.dickinson/personaldetails</p>	<p>This study is investigating whether electronic magnifiers offer real benefit to patients or whether optical magnifiers are in fact just as good or better.</p>	<p>NIHR</p> <p>Jan 13 – Jul 15</p> <p>£262,643</p>

Research and development work relating to assistive technology

Ref	Project title, organisation, contact	Summary	Funding
58	<p>PREDICT: randomised controlled trial of continuous positive airway pressure treatment in older people with obstructive sleep apnoea syndrome</p> <p>Imperial College London</p> <p>www.imperial.ac.uk/people/m.morrel</p>	<p>The trial found that in older people with obstructive sleep apnoea syndrome, continuous positive airway pressure reduces sleepiness and is marginally more cost-effective than best supportive care over 12 months.</p>	<p>NIHR</p> <p>Aug 09 – Jun 15</p> <p>£1,464,822</p>
59	<p>Pressure relieving support surfaces (PRESSURE 2)</p> <p>University of Leeds</p> <p>http://medhealth.leeds.ac.uk/info/400/leeds_institute_of_clinical_trials_research/1022/contact_us</p>	<p>The project is investigating the difference between high specification foam mattresses and alternating pressure mattresses.</p>	<p>NIHR</p> <p>Sep 13 – Oct 17</p> <p>£1,856,758</p>
60	<p>RATULS: robot assisted training for the upper limb after stroke</p> <p>Newcastle University</p> <p>https://research.ncl.ac.uk/ratuls/contact%20us/</p>	<p>The research is evaluating the impact of robot assisted training on arm function after stroke.</p>	<p>NIHR</p> <p>Jan 14 – Apr 19</p> <p>£3,094,000</p>
61	<p>RITA: developing a responsive interactive advocate</p> <p>University of Kent</p> <p>http://rita.me.uk/team/</p>	<p>The project aimed to develop and provide a digital champion, in the form of a humanised avatar, providing a friendly interface between the individual, family, friends, professions and services. Demonstration videos are available on the RITA website.</p>	<p>Innovate UK</p> <p>Jan 14 – Sep 14</p> <p>£498,040</p>
62	<p>SafeReads: a productivity tool for learners with dyslexia</p> <p>Dolphin Computer Access</p> <p>https://safereadsproject.wordpress.com/</p>	<p>The project is aiming to design and develop a productivity tool for children with dyslexia transitioning from Key Stage 2 to 3 (ages 8-14). The tool will support children in recognising problems with reading, teaching them to use strategies so that they cope with these problems and helping them to learn how to monitor their own progress.</p>	<p>Innovate UK</p> <p>Nov 14 – Apr 15</p> <p>£79,937</p>

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63	<p>SALT: designing scalable assistive technologies and services for independent healthy living and sustainable market development in the mixed digital economy</p> <p>Newcastle University</p> <p>www.saltproject.co.uk/contact/4556462091</p>	<p>The project aimed to develop methods for designing scalable assistive technologies and services and new business models to promote sustainable market development for independent healthy living in a mixed digital economy, and understand the factors that promote or inhibit the uptake, use and integration of assistive technologies for older people living in the community from a user-centred perspective.</p>	<p>Innovate UK</p> <p>Jul 11 – Jul 14</p> <p>£1,433,290</p>
64	<p>SAMS: software architecture for mental health self management</p> <p>University of Manchester; Lancaster University; King's College London</p> <p>http://ucrel.lancs.ac.uk/sams/contact.php</p>	<p>Promoting self-awareness of change in cognitive function is a key step in encouraging people to self-refer for assessment for dementia related conditions. The project aims to develop a tool to help individuals develop this self-awareness. A proof of concept study is expected to close to recruitment in October 2015.</p>	<p>EPSRC</p> <p>Apr 13 – Mar 16</p> <p>£692,196</p>
65	<p>Secure, multi-application network of shared sensors for assisted living, energy efficiency and home security</p> <p>ContinuumBridge</p> <p>www.continuumbridge.com</p>	<p>The research aimed to show a novel, secure, multi-application network of shared sensors that could be used by multiple services.</p>	<p>Innovate UK</p> <p>Jun 14- Feb 15</p> <p>£93,828</p>
66	<p>SHARE-IT: school-home research environment through intelligent technologies</p> <p>Institute of Education, University of London</p> <p>www.lkl.ac.uk/cms/index.php?option=com_comprofiler&task=userProfile&user=159</p>	<p>The researchers developed a digital platform (SHARE-IT) created to support the development of social communication in children with autism.</p>	<p>EPSRC</p> <p>Feb 13 – Jul 14</p> <p>£241,599</p>

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67	Smart composite puncture-proof and flat-free tyres Flat Free Tyres (t/a Greentyre) http://www.greentyre.co.uk/contact.php	The research aims to develop an advanced flat-free tyre to meet demand in the wheelchair and other markets.	Innovate UK Oct 14 – Mar 16 £161,235
68	SONOPA: social networks for older adults to promote an active life Docobo http://www.sonopa.eu/contact-us/	Innovate UK is co-funding this European project which combines a social network with activity recognition in a smart home environment to stimulate and support activities and daily life tasks. During August 2014, the first prototype of the system was installed in a home in the UK to test the interoperability and usability of the different sensor modules.	Innovate UK May 13 – Apr 16 £150,641
69	STEMReader ECS Partners www.stemreader.org.uk/contact/	The project is developing STEMReader, a tool that will assist with reading aloud and comprehending mathematical symbols and notations.	BIS Nov 14 – May 16
70	Stories at the dentist University of Dundee http://aac.computing.dundee.ac.uk/satd/	The researchers developed a speech app, running on an iPad, to help people with learning or communication disabilities prepare for a visit to the dentist.	EPSRC Jan 13 – Sep 14 £293,221
71	Telehealth for COPD University of Oxford http://www.ibme.ox.ac.uk/contact	The project, jointly funded by the Wellcome Trust, found that home based, unassisted, daily use of the mobile telehealth based application is feasible and acceptable to people with COPD for reporting daily symptoms and medicine use, and to measure physiological variables such as pulse rate and oxygen saturation.	DH Jun 12 – May 15

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72	Towards bespoke bio-hybrid prosthesis: manufacturing bio-inductive interfaces in 3D Loughborough University www.lboro.ac.uk/departments/mechman/staff/russell-harris.html	The researchers envisage a prosthesis that will respond to biological feedback via a tissue engineered abiotic/biotic conduit between the artificial prosthetic and remaining biological muscle and nerves.	EPSRC Dec 14 – Jun 18 £785,827
73	True Colours: development and evaluation of SMS-based monitoring and management service for people with bipolar disorder Oxford Health NHS Foundation Trust https://www.truecolours.nhs.uk/www/info.jsp	The project has developed the 'True Colours' website, which allows people with bipolar disorder to report their mood either online or by text message.	NIHR Dec 09 – Dec 14 £1,661,806
74	TRUMP: A Trusted Mobile Platform for the Self-Management of Chronic Illness in Rural Areas University of Aberdeen www.trump-india-uk.org	The project is exploring the potential of mobile technologies in the development of a platform to support chronic disease management by simultaneously considering the needs of rural areas of India and the UK.	EPSRC Jan 12 – Sep 15 £1,684,860
75	Trustworthy robotic assistants Universities of Bristol, Hertfordshire, Liverpool, and the West of England http://robosafe.org/	The researchers are investigating how robotic assistants can be proven to be safe within the home environment.	EPSRC Mar 13 – Oct 16 £1,200,701
76	TWIST: what is the clinical and cost-effectiveness, and acceptability, of Wii Sports for improving dominant arm function after stroke? Royal Cornwall Hospitals NHS Trust http://medicine.exeter.ac.uk/apex/people/drjenniferwingham/	A qualitative study within a randomised controlled trial investigating the effectiveness of using the Nintendo Wii Sports™ games for arm rehabilitation following stroke found that this may provide an engaging and flexible form of rehabilitation with relatively high reported usage rates in a home setting.	NIHR Jan 11 – Aug 14 £249,794

Research and development work relating to assistive technology

Ref	Project title, organisation, contact	Summary	Funding
77	Using the Microsoft 'Kinect' as a stroke rehabilitation tool Nottingham Trent University www.ntu.ac.uk/apps/staff_profiles/staff_directory/124847-0/26/philip_breedon.aspx	The researchers carried out development work on a 'gaming environment' to assist in the rehabilitation of patients with facial paralysis.	NIHR May 13 – Oct 14 £323,007
78	WE ARE ABLE: displays and play University of Central Lancashire http://weareable.org.uk/contact/	The project aims to investigate whether wearable displays can assist children with autism and children with visual impairment when playing with other children. The researchers test ran a participatory design activity in a primary school in December 2014.	EPSRC Sep 14 – Sep 16 £90,586
79	Wearable assistive materials University College London www.cege.ucl.ac.uk/arg/WAM/Pages/WAM.aspx	The research is developing concepts for an exoskeleton to support people to walk unaided, and looking at materials and techniques that might improve the design.	EPSRC Mar 13 – Feb 16 £994,066
80	Wheelchair stability assessment system Coventry University www.coventry.ac.uk/business/health-design-technology-institute/health-design-technology-institute-research-projects/wheelsense/	The project developed a system for measuring and improving wheelchair performance, which uses a folding platform with measurement software accessed via a laptop or desktop computer that can be used by clinical staff in specialised equipment services.	NIHR May 10 – Apr 14 £600,000
81	Year Zero Illumina Digital www.digitallifesciences.co.uk/year-zero/	Year Zero has been supported as part of the dallas programme to deliver telehealth, telecare and assisted living at scale. The project has created a suite of innovative digital services and apps supported by, or interacting with, an individual's personal health record.	Innovate UK Jun 12 – May 15 £2,916,190